

**REMARKS**

Applicants have amended their specification in order to correct a translation error in the English-language specification as originally filed, i.e., to describe a “two-row barley” rather than a malting barley; and have further amended their specification to refer to Figs. 1-4, rather than Figs. 6-9, consistent with present amendments to the drawings and consistent with the amended specification submitted August 23, 2006 (hereinafter “Applicants amended specification”). It is respectfully submitted that these amendments do not add new matter to the application, particularly noting the amendment filed July 15, 2004, in International (PCT) Application No. PCT/JP2004/002353, as well as the original specification of No. PCT/JP2004/002353.

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have amended claims 1, 2 and 4 to recite “an immature seed”, rather than a seed during a maturation period from immediately after the heading until the maturation. Note, for example, the paragraph bridging pages 1 and 2 of Applicants’ amended specification. Furthermore, Applicants have amended claims 3, 4 and 7 to recite “two-row barley”, rather than malting barley; and have cancelled claims 5, 6 and 8 without prejudice or disclaimer.

In addition, Applicants are adding new claims 9-13 to the application. Claim 9, dependent on claim 1, recites that the immature seed is a seed 4-5 weeks after heading; and claims 10 and 11, each dependent on claim 1, respectively recites that the food ingredient is in a form of an aqueous solution; and recites that such food ingredient is in a form of a dry powder, having been subjected to a drying treatment at 110°C or lower. Note, for example, pages 8 and 10 of Applicants’

amended specification. Claims 12 and 13, dependent respectively on claims 1 and 3, respectively defines a composition ratio of the amino acids of valine, isoleucine, leucine, arginine and glutamine, and further defines the pH, consistent with descriptions on pages 12 and 11, respectively, of Applicants' amended specification.

The objection to claims 5, 6 and 8, set forth in Item 1 on page 2 of the Office Action mailed November 13, 2009, is moot, in light of present cancelling of claims 5, 6 and 8 without prejudice or disclaimer of the subject matter thereof.

Applicants respectfully traverse the rejection of their claims under the second paragraph of 35 USC 112, as being indefinite, set forth in Item 3 on pages 2 and 3 of the Office Action mailed November 13, 2009, especially insofar as this rejection is applicable to the claims as presently amended. Thus, claims 1, 2 and 4 have been amended to recite "an immature seed"; accordingly, it is respectfully submitted that the rejection of claims as indefinite, in that it is not clear what maturation encompasses or how it is defined, is moot. It is respectfully submitted that one of ordinary skill in the art would have known what is meant by an "immature" seed; and, accordingly, such term would not have been indefinite.

Applicants respectfully traverse the rejection of claims 1-3, as set forth in the second paragraph on page 3 of the Office Action mailed November 13, 2009. It is respectfully submitted that the concentration of each amino acid indicates the amount of the amino acid released into water from 100 g of food ingredient by autolysis reaction, and is not the amount of amino acid contained in 100 g of the food ingredient. It is respectfully submitted that one of ordinary skill in the art would have known the meaning of such contents from Applicants' disclosure as a whole, including, in particular, the Examples beginning on page 12 of Applicants' amended

specification and in particular the Tables on pages 13, 15, 17 and 18, 20 and 21-23, in connection therewith.

In connection with the weight of the food ingredient (i.e., 100 g), please be advised that the weight is based on its dry weight, as would have been known by one of ordinary skill in the art. In connection therewith, note the third paragraph on page 3 of the Office Action mailed November 13, 2009.

Applicants respectfully traverse the conclusion by the Examiner that the phrase “60% flour” renders the claims indefinite, the Examiner contending that it is unclear what is encompassed by 60% flour. It is respectfully submitted that one of ordinary skill in the art would have known that the term “60% flour” means “flour having a yield of 60%”, or, in other words, “60% extracted flour”. As can be appreciated from the paragraph bridging pages 9 and 10 of Applicants’ amended specification, the flour was prepared, for example, using a flour mill such as a Buhler test mill; and especially in view of the description in Applicants’ amended specification, it is respectfully submitted that one of ordinary skill in the art would have known the meaning of “60% flour” such that this expression would not have been indefinite.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed November 13, 2009, that is, the teachings of U.S. Patent No. 3,716,365 to Walmsley, et al., under the provisions of 35 USC 103.

It is respectfully submitted that the teachings of this applied reference would have neither disclosed nor would have suggested such a food ingredient as in the present claims, obtained by grinding an immature seed of wheat or barley, with the

content of various amino acids being that set forth in claim 1; or such a food ingredient as in claim 2, obtained by grinding an immature seed of wheat or barley and having content of various amino acids as set forth in claim 2.

Furthermore, it is respectfully submitted that the teachings of this applied reference would have neither disclosed nor would have suggested such a method of production of a food ingredient as in the present claims, which includes allowing a mixture of bran and shorts obtained by grinding a mature seed of wheat or barley selected from a group of wheat, two-row barley and naked barley to be immersed in water under a condition of a pH of 3.0-5.5 and at 40-60°C for 1-6 hours, to provide a content of specified amino acids as set forth in claim 3.

Moreover, it is respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested such a method of production of the food ingredient as in claims 1 and 2, including allowing a ground product of an immature seed of wheat, two-row barley and naked barley to be immersed in water under a pH of 3.0-5.5 and at 40-60°C for 1-6 hours. Note claims 4 and 7.

Furthermore, it is respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested such food ingredient, or such method, as in the present claims, having features as in claims 1-3 as discussed in the foregoing, and, additionally, wherein the immature seed is a seed 4-5 weeks after heading (see claim 9); or wherein the food ingredient is in a form of an aqueous solution (see claim 10) or in a form of a dry powder, having been subjected to a drying treatment at 110°C or lower (see claim 11); and/or wherein the food ingredient has a composition ratio of the various amino acids as in claim 12; or the preferred pH condition as in claim 13.

As will be discussed in more detail infra, according to the present invention the amino acids are produced by utilizing an action of protease which is endogenously present (that is, an autolysis reaction), not by adding protease externally. According to the present invention, it is possible to elevate the content of the recited amino acids by selectively decomposing an easily decomposable (storage) protein, only due to an action of the protease endogenously present in the (storage) protein in the specified seeds (e.g., immature seed) of wheat or barley.

That is, according to the present invention, the protease endogenously present in the seed is used to elevate amino acid content. It is respectfully submitted that the protease has never been noteworthy due to its low activity, and thus has been hardly studied and reported. According to the present invention, and, e.g., through use of the processing according to the present invention, the endogenous protease can be used to selectively elevate the content of the specified amino acids, accomplishing the objectives of the present invention as discussed infra.

Thus, the present invention relates to a food ingredient including elevated contents of free glutamine, valine, isoleucine, leucine and arginine, and its production method.

As described in the paragraph bridging pages 2 and 3 of Applicants' amended specification, an advantage of ingestion of branched chain amino acids, as well as glutamine and arginine, has become common knowledge in the fields of sports science. However, as described in the first full paragraph on page 4 of Applicants' amended specification, there is no food containing free branched chain amino acids, and glutamine and arginine, in high concentration in nature, and, thus, there is no choice but to depend on supplements for ingesting high concentrations of these amino acids. But, production costs of these amino acids are comparatively high.

Against this background, Applicants provide a production method for forming a food ingredient having an elevated content of free amino acids such as branched chain amino acids, glutamine and arginine, and provide a food ingredient having such elevated content. As described in the paragraph bridging pages 4 and 5 of Applicants' amended specification, the present inventors have found that when the ground product of the immature and mature seeds of various materials (e.g., wheat or barley) is immersed in water under specified conditions, protein is decomposed by the action of protease which is endogenously present in high concentration in bran primarily on the external side of the seed, and shorts including germ, and, thus, specific amino acids are released in high concentrations. Thus, a food ingredient can be produced having relatively high contents of free branched chain amino acids, glutamine and arginine, as described in the paragraph bridging pages 23 and 24 of Applicants' amended specification (see also the Examples on pages 12-23 of Applicants' amended specification).

Walmsley, et al. discloses a process for manufacturing a brewers' wort, for use in the manufacture of non-distilled alcoholic beverages such as beer, ale, lager, and the like, as well as an enzyme system for use in obtaining such brewers' wort. The method is described most generally from column 3, line 50, through column 4, line 14, and includes reacting a ground or milled starch-containing material under defined temperature and time conditions with up to 30%, based on the weight of starch-containing materials, malt or malt extract and discrete protease and  $\alpha$ -amylase enzymes in a specified amount; and, subsequent thereto, heating an aqueous slurry of the materials, with a pH adjusted if need be to between about 5.0 and about 6.5, to between about 40° and 55°C for a period of between about 30 and about 120 minutes. See also column 7, lines 23-30, of this patent.

It is respectfully submitted that Walmsley, et al. would have neither taught nor would have suggested such a food ingredient, or such method, as in the present claims, including use of the immature seed of wheat or barley, or use of the mature seed of wheat or barley selected from the group of wheat, two-row barley and naked barley, or content of the various amino acids, as in the present claims, and advantages thereof.

It is emphasized that Walmsley, et al. discloses a beer (and the like) brewing ingredient, as indicated by the Examiner in the last paragraph on page 4 of the Office Action mailed November 13, 2009. It is respectfully submitted that this reference does not disclose, nor would have suggested, use of the specific materials as in the present claims, or content of the various amino acids, as presently claimed.

The contention by the Examiner in the third paragraph on page 5 of the Office Action mailed November 13, 2009, that one of ordinary skill in the art at the time the invention was made "would have optimized, by routine experimentation, the percentage in the beer brewing ingredient" of Walmsley, et al., to obtain the desired processing flowability, is noted. The Examiner is respectfully reminded that Walmsley, et al. discloses a process for making brewers' wort, in manufacturing non-distilled alcoholic beverages such as beer and the like. Based thereon, it is respectfully submitted that the Examiner has not established that optimization in connection with the processing of Walmsley, et al. would have proceeded to the processing as in the present claims, including use of the specific materials and amino acid content. In connection with amino acid content, Applicants respectfully traverse the contention by the Examiner in the last paragraph on page 5 of the Office Action mailed November 13, 2009, that the process of Walmsley, et al. would intrinsically display the recited amino acid profile. In view of different materials

utilized in Walmsley, et al., on the one hand, and in the present invention, on the other; and different processing to produce a different product, it is respectfully submitted that the Examiner has not established inherency of amino acid content as in the present claims, in the product produced by Walmsley, et al.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1333.46520X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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